Collisionless reconnection in the structure and dynamics of active regions

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New theoretical interpretations are discussed of the *Yohkoh* data on the site and mechanism of magnetic energy transformation into thermal and kinetic energies of superhot plasmas and accelerated particles. We develop a model that explains observed properties of reconnection in active regions and in flares. The transition from slow reconnection to fast one is demonstrated by numerical solutions of the problem taking into account anomalous resistivity and anomalous heat conduction. The model also makes intelligible the observed decrease (increase) of the separation between the double-footpoint hard X-ray sources in the more impulsive (less impulsive) flares. An accumulation of the reconnected magnetic flux can explain the observed ascent motion of the coronal source of hard X rays in flares. We demonstrate some features of electron and ion acceleration in collapsing magnetic traps.